Reproductive Rates in White-tailed Deer of Florida

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This paper presents possible reasons for the low reproduction rates of white-tailed deer (*Odocoileus virginianus*) in central Florida and attempts to show that overpopulation and quantity of available forage are not involved.

In most regions of the Southeast, quantity of available food is sufficient, yet average reproductive rates are lower than for most northern areas. Sileo (1966) assembled reproductive data on 8,564 white-tailed deer from 20 eastern states. He found that fecundity rates of white-tailed deer in southern forests were significantly lower than those of deer in either the northern forests or the central hardwood forests. In the South, fecundity of deer in the Coastal Plain was lowest and that of deer in the Piedmont was highest. Forest type and soil were found to exert the greatest influence on deer fecundity. Short (1969) stated that most upland forests in the South have infertile soils and produce roughages that are seasonally deficient in net energy, protein, and phosphorus for deer.

In the present study, 99 does were collected from central and north Florida for examination during February when food supplies were considered lowest. All deer were inspected for fat content of the bone marrow, pericardial and peritoneal fat, numbers of ecto- and endoparasites, body size, weight, and stomach contents.

Variation in Reproductive Rates

No deer suffered from malnutrition. After adjustment for age differences, body weight and physical measurements of the 61 does from central Florida did not differ significantly ($P<.05$) from the 38 does from north Florida. However, the average reproductive rate of does from central Florida was 0.98 fetus per doe as compared to slightly over 1.5 in deer from north Florida. The reproductive rate of the central Florida sample was similar to that (1.06) reported in New York where winter starvation was chronic (Cheatum and Severinghaus 1950). Reproductive rates of deer in north Florida were comparable to those of northern white-tails on ranges where winter foods were adequate.

Availability of Forage

Quantity and variety of available forage does not appear to be limiting factors to herd fecundity in central Florida. Quantities of available forage on four study areas during winter ranged from 80 pounds per acre (oven-dry) on the longleaf pine-turkey oak site to from 400 to 1,800 pounds per acre on two flatwood sites and one sand pine-scrub oak type. The number of species of major woody plants available to deer ranged from 20 to 30 (Harlow 1959), and the study sites contained small acreages of bayheads, hammocks, and cypress swamps which added to habitat diversity.

Deer Populations

Deer numbers on three of the study areas in central Florida were moderate to low, varying from one deer per 40 acres to one per 100 acres. Only one area, the longleaf pine-turkey oak, had a population density considered high—one deer per 13 to 20 acres (Harlow 1959). The reproductive rate of adult does from this area averaged 0.86, even lower than that of does from the other areas which averaged 0.98. Also, a comparison of the weights of adult does in the same age classes from the different sites showed that deer from the longleaf pine-turkey oak type averaged lighter in weight but not significantly (Harlow and Jones 1965). However, an examination of the bone marrow of 20 deer sacrificed from this area of comparatively high population during February 26 to March 3, 1962, by the Southeastern Cooperative Deer Disease Study, indicated the deer were in good physical condition. The fat content of the bone marrow exceeded 90 per cent. Low reproductive rates are often associated with poor physical condition.

Effects of Hunting

Deer hunting with dogs occurred annually on all vegetation types, except the longleaf pine-turkey oak area which exhibited the lowest reproductive rate. Hunting with dogs has been blamed for poor deer reproduction; however, this has not been adequately demonstrated. Such hunting occurs in north Florida where reproductive rates are higher. On areas where deer hunting with dogs is allowed, the peak of the rutting season has passed by the time hunting season starts (Harlow and Jones 1965).

SOIL FERTILITY

Low fertility of the soils of central Florida may be an important factor limiting herd reproduction. The upland soils of northwest Florida (particularly Leon, Gadsden, and Madison Counties where the reproductive data from north Florida were collected) have much more clay present in the subsoil than do upland soils in central Florida, and, according to analysis, the upland soils of northwest Florida also have higher potential fertility (Alsberg et al., 1952).

Another possible limiting factor may be a lack of certain mineral elements in the soil. Data supporting this possibility were reported in a study of range cattle management in Alachua County, Florida, by Camp (1932). His studies showed that the calf crop averaged only 34.4 per cent in flatwoods and 37.1 per cent in pine-oak uplands, while calf crops in prairies averaged 54.1 per cent and those in hammock habitats averaged 71.6 per cent. "Salt sick," or nutritional anemia, was reported to be common in pine-palmetto flatwoods and pine-oak uplands, where the soils are mostly deep white and gray sands without red clay which is found in prairies and hammocks. Becker et al. (1931) found that "salt sick" occurs on white and gray sandy soils and on many soils which have no clay, and that affected cattle recovered when changed to clay ranges. These soils low in clay are deficient in iron, or in iron and copper, and it is believed that the "salt sick" condition was caused by the scarcity of these elements.

Thornton et al (1960), however, states that "Preliminary results of experiments underway but not yet completed, indicate a correlation between the occurrence of 'salt sickness' in cattle and the cobalt content of the soils upon which the animals were pastured. These studies also indicate a relation to available phosphorus and copper but the correlation was not as high as with cobalt. Cattle were anemic when pastured on all soils containing less than 0.02 parts per million of available cobalt and only one case of anemia was found on soils containing more than this amount." If cobalt is the trace element responsible for the poor performance of deer, this is not the first instance in which it has been suspected of playing a part. Smith et al. (1956) considered that inadequate cobalt levels partially explain the poor reproductive performance of deer in certain sections of North Carolina.

Lignin Content and the Availability of Mast

Another factor influencing low reproductive rates of deer in central Florida may be the high lignin content associated with forage in the Coastal Plain. Halls et al. (1957) found that lignin content of browse plants in the Georgia Coastal Plain varied from 21 per cent in the summer to 26 per cent in the winter. They state that this high lignin content renders the browse nearly indigestible and that large quantities of lignin tend to decrease the digestibility of other nutrients. The browse plants studied were also relatively low in the more digestible portion of the carbohydrate fraction and, therefore, low in energy. It is known that lignin reduces digestibility and energy value as well as intake.

Where forage is high in lignin content and low in energy over large areas, mast crops may assume a very important role, depending on the extent that mast contributes to the annual diet of a deer herd. Harlow and Tyson (1959) found a significant correlation between the abundance of acorn and palmetto mast and the weight and reproduction of deer in central Florida. When mast production was low, weights of harvested deer were lower than when mast was abundant. Also, the percentage of harvested 1 1/2-year-old bucks declined the second hunting season following the year when mast growth was low. According to Morrison (1957), acorns have no digestible protein but are high in fat, which produces energy. In central Florida, a lack of acorns and palmetto berries as a result of periodic mast failures may further compound a detrimental effect on reproduction of the naturally high lignin content of the forage.

Although high lignin content of the forage and mast failures also occur in north Florida where reproductive rates are higher, I believe that it is the additional factor of soil deficiencies that accounts for the lower reproductive efficiency of deer in central Florida.

This does not necessarily imply that deer populations from comparatively poor range cannot reach densities approaching those on better range. I am only theorizing that herd increases will occur at a much slower rate and that high densities will be sustained for shorter periods.

Conclusions

It is obvious that more detailed information is needed on the

nutritional requirements of deer in Florida and the inherent capacity of the different vegetational types to support white-tails. Such data are necessary before we can develop adequate and economically feasible management techniques to improve the range and reproductive rate of particular populations. Possible avenues of further investigation include:

1. Methods of increasing production of long-lasting, palatable, nutritious foods such as grasses and clovers on deer range.
2. Methods of maintaining natural deer foods in the most palatable and nutritious state or perhaps through such techniques as prescribed burning, fertilizing, and mowing.
3. Methods of increasing certain natural foods which are particularly high in energy content, such as acorn mast and palmetto berries.
4. Methods of correcting mineral deficiencies.

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